

Solar Thermal Power Systems Collection, 1977-1980

1.5 cubic feet

JPL 234

History

The Industrial Associates program at the California Institute of Technology was organized in 1949. The Program developed industrial interest in research and education in science and engineering. The Program has been successful in achieving these objectives and continues to provide an unequalled opportunity for industrial personnel at both research and management levels to meet and confer with the faculty and research staff at Caltech and The Jet Propulsion Laboratory. Through the success of this program, JPL projects have involved technology application to the commercial, industrial or public service sector and the Energy and Technology Applications projects that also includes thermal solar energy application projects.

In July 1977, JPL began creating Small Power Systems Projects under an interagency agreement between NASA and the Department of Energy. Due to this agreement, JPL was in a unique position in responding to a current DOE requirement for a program that would provide innovative analytical techniques to develop improved energy utilization systems for industrial and solar thermal power plants. JPL's Victor Anselmo and Nicholas R. Moore worked largely on the proposal development efforts.

Dr. Victor Anselmo had a Ph.D. in Mechanical/Aerospace Engineering in 1971 from Oklahoma State University. As a Senior Engineer at JPL, he conducted thermodynamic systems analysis of infrared instruments for the study of planetary atmosphere, surfaces and magnetometer instruments for the study of planetary fields.

Dr. Nicholas R. Moore, with a Ph.D. in Mechanical Engineering 1972 from the University of Arkansas performed synthesis and evaluations of alternative energy conserving systems for industrial plants, analyzed energy usage characteristics of industrial equipment, including evaporators, dryers, heat pumps and heat engines.

To accomplish the goal of the interagency agreement, the Thermal Power Systems Office of the DOE was responsible for developing the technology for low cost, long life and reliable solar thermal electric power systems suitable for a wide range of terrestrial applications. Also, the DOE established program offices within the Thermal Power Systems Branch in two primary areas of solar thermal energy, i.e., large thermal power system applications and small thermal power systems applications. The Small Thermal Power Systems Section managed the latter. Several projects formed at the Jet Propulsion Laboratory supported this section at the Department of Energy.

The Small Power System Applications Project (SPSA) was one of three related activities co-located at JPL that comprised the Thermal Power Systems (TPS) organization. The other two projects were Advanced Solar Thermal Technology (ASTT), and Point Focusing Distributed Receiver Technology (PFDRT). The ASTT effort covered a broad spectrum of component and subsystem technology development. The PFDRT project was directed specifically to developed point focusing distributed receiver systems. The JPL work was based on a parabolic dish and integral receiver.

In addition, this technology was expected initially to be applied to relatively small power systems up to a few megawatts made up of identical modules, each module capable either of generating electricity, or of supplying heat for industrial purposes, depending on the type of

receiver used.

Another co-located JPL erected project was the Small Community Solar Thermal Power Experiment. At the time, it was the first solar thermal plant specifically designed as an alternate source of electric energy for small communities in this country that was made to pursue a parabolic dish system using distributed generation. The Power Plant design and development proceeded under the technical management of JPL. Ford Aerospace and Communications Corporation was the system contractor. The United States Department of Energy, the sponsor for this project, had the responsibility for site selection and NASA's

Lewis Research Center provided engine and power conversion support.

However, the technology selected for the Small Community Solar Thermal Power Experiment was considered near-term with regard to development and availability. The concentrator was a parabolic dish developed by the General Electric Company under the Low Cost Concentrator activity within the Module Development element of the JPL Solar Thermal Power Systems Project. It was a first generation concentrator using a reflective film bonded to a reinforced plastic substrate. The receiver was designed to heat an intermediary heat transfer fluid, which developed a new approach for Ford. The power conversion subsystem employed a Rankine engine.

In addition, the Phase II effort included design, development and verification testing. This was a two-year activity that provided a system design including the plant control system and other balance of plant considerations. The verification testing was at the JPL Edwards Facility Parabolic Test Site. Testing was conducted at the module level; that included a complete concentrator; receiver and engine assembly test.

As a result of these studies, engine and receiver modules were mounted on the test bed concentrator at the JPL desert test site during the calendar year of 1980, and continued through 1983.

Provenance

Victor Anselmo, Systems Engineering, Section 316, transferred the material to the Archives in July of 1990.

Collection Description and Arrangement

The collection includes the co-located documentation with JPL and the Small Power Systems Project. This consists of interoffice memoranda, interoffice publications and solar thermal power systems experiments and project documentation. Also included are industrial energy conservation reports, industrial energy conservation presentations and proposals, industrial energy conservation miscellaneous files, parabolic dish collector systems files, annual technical reports, energy conservation in citrus fruit processing reports, and small thermal power systems technologies and small community solar thermal power projects material from 1977 through 1980.

The primary goals of the thermal power systems project at JPL were to produce electricity or heat at a cost competitive with conventional alternatives, and to develop the technical and economic readiness of cost-effective PFDR technology necessary to accelerate market penetration of small power systems. Market penetration required a matured technology coupled with favorable to market penetration. The project attempted to enter market areas of high-cost energy first and to enter large markets with corresponding lower energy costs later.

Such high production levels clearly justify the use of mass production manufacturing techniques through the 1990-2000 time frame.

The collection is arranged in a chronological date order according to the series of events.

Also, folder 48 is located in an oversize box.

Conservation/Preservation

Standard preparations of documents for long term storage were completed.

Separation Statement

About 1.5 cubic feet of materials collected by Anselmo and a part of the original accession were removed during processing. These materials were published items created by others than JPL. A list of these items has been retained.

Finding Aids

There are no other finding aids.

File Folder List

File titles are derived from collection section headings; project identification numbers as found were retained.

Box 1

- Fld 1 5040-50. Richard P. O' Toole, Ralph E. Barter, (e.g.), "Sizing Solar Water Heaters: Algorithms For Design and Implications For Public Policy," *JPL Economics and Policy Analysis Series, A Southern California Gas Company Project Sage Report*, March 1977.
- Fld 2 Carole L. Hamilton, "Dynamic Modeling and Sensitivity Analysis of Solar Thermal Energy Conversion Systems," August 28 - September 2, 1977, pp.1-6.
- Fld 3 Nick R. Moore, Richard George G. Beatty, Research Proposal for Sunkist Growers, Inc.; *JPL Proposal No. 70-914, Energy Conservation in Citrus Fruit Processing*, December 2, 1977.
- Fld 4 Oren V. Hester, Dr. Macgregor, "A Probabilistic Model of Insolation for the Mojave Desert Area," *JPL Publication 78-11*, March 1, 1978.
- Fld 5 Yi-Chien Wu, "Solar Receiver Performance in the Temperature Range of 300 to 1300°C." *Final Report. (Ad Hoc Task TAD R&D-3, DOE-NASA IAE (46-26-1060))*. May 5, 1978.
- Fld 6 DOE/JPL-1060-15. Dr. Abe Feinberg, Dr. Ralph F. Miles, "Thermal Power Systems Small Power Systems Applications Project," *Decision Analysis For Evaluating and Ranking Small Solar Thermal Power System Technologies*, June 1, 1978.
- Fld 7 Dr. Macgregor S. Reid, Dr. Carole L. Hamilton, "The Engineering Analysis of Solar Radiation," July 15, 1978, pp. 187-217.
- Fld 8 Rosalyn H. Barbieri and Thomas J. Kuehn. "Barriers and Incentives to the Innovation of Small Solar Thermal Electric Power Systems: A Commercialization Perspective For R&D Management," *The 1978 Annual Meeting, American Section of the International Solar Energy Society, Denver, Colorado*; August 28-31, 1978, pp. 391-395.
- Fld 9 Robert O. Hughes. "Optimal Control of Sun Tracking Solar Collectors." August 28-31, 1978, pp. 1-6.
- Fld 10 DOE/JPL-1012-7. John V. Goldsmith, Donald B. Bickler. "LSA Project Technology Development Update, " *Low - Cost Solar Array Project, 5101-104*. August 30, 1978.
- Fld 11. DOE/JPL-1060-4. Toshio Fujita, R. Marvi, "Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990-2000, *Thermal Power Systems Advanced Solar Thermal Technology Project, 5101-99*; November 15, 1978.
- Fld 12 Interoffice Memoranda. Rosalyn H. Barbieri, Industrial Energy Consumption Data Base-Planning Meeting November 29-30, 1978, Aerospace Corporation, Los Angeles, January 12, 1979.

- Fld 13 DOE/JPL1060-9. Alan T. Marriott, "Thermal Power Systems Small Power Systems Applications Project," *Annual Technical Report 5103-36, Vol. I: Executive Summary Fiscal Year 1978*; January 15, 1979.
- Fld 14 DOE/JPL1060-13. Dr. Fikry L. Lansing, "Heap: Heat Energy Analysis Program," *A Computer Model Simulating Solar Receivers; Thermal Power Systems Advanced Solar Thermal Technology Project, 5102-106*; January 15, 1979.
- Fld 15 DOE/JPL-1012-79/5. Robert G. Chamberlain, "A Normative Price for a Manufactured Product: The Samics Methodology; Vol. I. Executive Summary, *Low - Cost Solar Array Project 5101-93*, January 15, 1979.
- Fld 16 778-14-05. Dan Schneiderman, Industrial Conservation and Utilization of Alternative Energy Sources, Research and Technology Objectives and Plans, February 13, 1979.
- Fld 17 Marie L. Slonski. "Energy Systems Economic Analysis (ESEA) Methodology and User's Guide," *Low - Cost Array Project 5101-102*. February 15, 1979.
- Fld 18 Rosalyn H. Barbieri. "The Solar Potential for Process Heat: A Commercialization Perspective," March 12-15, 1979, pp. 1-6.
- Fld 19 DOE/JPL-1060-7. Dr. John Lucas, "Annual Technical Report," *Thermal Power Systems Point-Focusing Distributed Receiver Technology Project, No. 5104-26, Fiscal Year 1978 Vol. II: Detailed Report*; March 15, 1979.
- Fld 20 DOE/JPL-1060-23. Robert J. Ewing, Dr. James Zwissler, "Performance Prediction Evaluation of Ceramic Materials in Point-Focusing Solar Receivers," *Thermal Power Systems Advanced Solar Thermal Technology Project, No. 5102-123*; June 1, 1979.

Box 2

- Fld 21 Interoffice Memoranda. Yukio Nakamura, New Business Projections for the Conservation Program Office Through Fiscal Year 1980, June 13, 1979.
- Fld 22 70-1242. Nick Moore, Development of Improved Energy Utilization and Management Systems for Industrial Plants, Proposal Summary and Routing Sheet, June 21, 1979.
- Fld 23 Yukio Nakamura. Industrial Energy Conservation Program, June 29, 1979.
- Fld 24 Interoffice Memoranda. Thomas R. Howard, Mark Broussard, Interview Trip Report - National Food Processors Association. July 13, 1979.
- Fld 25 Facsimile. Yukio Nakamura, NASA (RTOP), Research Technology Objectives and Plans, 778-14-05, July 27, 1979.
- Fld 26. Interoffice Memoranda. Nick Moore, Victor Anselmo, Additional Funding for Development of Proposal to DOE/Divisions of Industrial Energy Conservation, August 3, 1979.

- Fld 26a Interoffice Memoranda. Alan T. Marriott, JPL/Caltech Industrial Conservation Capabilities and Related Experience, August 10, 1979.
- Fld 27 JPL. Department of Energy Industrial Program Proposal, August 17, 1979.
- Fld 28 Interoffice Memoranda. Thomas R. Howard, Fiscal Year 1979 RTOP Progress Report - Industrial Conservation, Cogeneration and Utilization of Alternative Fuels, August 21, 1979.
- Fld 29 Vincent C. Truscello, A. Nash Williams, "Heat and Electricity from the Sun Using Parabolic Dish Collector Systems," September 1979, pp. 1-13.
- Fld 30 Cris L. Bockenstette. "Increasing the Efficiency of Rubber Utilization," September 1979.
- Fld 31 JPL. Thomas R. Howard, Industrial Conservation, Cogeneration, and Utilization of Alternative Fuels; Exit Review, September 10, 1979.
- Fld 32 Interoffice Memoranda. Yukio Nakamura, Report of Trip to Washington, D. C., 20-21 September 1979, September 25, 1979.
- Fld 33 Letter. J. W. Longoria, Jr., Final Technical Report, Development of Controlled- Rated Cooling System for Cryopreservation of Red Blood Cells, October 1, 1979.
- Fld 34 Interoffice Memoranda. Thomas R. Howard, Industrial Conservation Incentives Presentation of Results, October 4, 1979.
- Fld 35 Peggy Panda. Thermal Power Systems Project, October 1979.
- Fld 36 Melvin A. Leo. "Energy Cogeneration in Citrus Processing," *Contract No. DE-AC03-79CS40263, Management Plan Milestone Schedule and Status Report Cost Plan Manpower Plan*, December 10, 1979, (JPL Rep. Nick Moore).
- Fld 37 Victor Anselmo. Department of Energy Proposal Outline, October 15, 1979.
- Fld 38 Cris Bockenstette. Current Industrial Conservation R and D Activities, October 1979.
- Fld 39 Victor Anselmo. Document Summary Proposal, Document ID: 4532A, October 16, 1979.
- Fld 40 Draft. Richard B. Davis, Overview of the Alternative Power System Economic Analysis Model, December 7, 1979.
- Fld 41 Interoffice Memoranda. Rosalyn Barbieri, November 28 Seminar on the Industrial Sector as a Potential Market for New Energy Technologies, December 12, 1979.
- Fld 42 Interoffice Memoranda. Birur C. Gajanana, Preliminary Report on a Study of Dish-Brayton Power Systems, January 22, 1980.
- Fld 43 Max A. Gyamfi, Thomas R. Howard, Industrial Conservation Incentives

Implementation, February 1980.

- Fld 44 Interoffice Memoranda. Richard Burke Davis, (APSEAM) Alternative Power System Economic Analysis Model Documentation and Review, February 27, 1980.
- Fld 45 Interoffice Memoranda. Alan T. Marriott, The Small Community Solar Thermal Power Experiment - A Paper to be Presented at the June Aerospace Standards/International Solar Energy Society/Meeting, April 8, 1980.
- Fld 46 Eric Hine. Computer Search Evaluation, April 9, 1980.
- Fld 47 Interoffice Memoranda. Richard Burke Davis, APSEAM Documentation: Equation Summary, April 15, 1980. (Oversize computer form)
- Fld 48 Interoffice Memoranda. Eric Hine, Computer Search Evaluation, April 16, 1980.
- Fld 49 Interoffice Memoranda. Philip I. Moynihan, Action Items from the System Engineering and Development Task Meeting of 17 April 1980.
- Fld 50 Library Material. Victor Anselmo, NASA/RECON Reference List Evaluation, April 28, 1980.
- Fld 51 Victor Anselmo. Development of Improved Energy Utilization and Management Systems for Industrial Plants - Department of Energy, July 7, 1980.
- Fld 52 Miscellaneous. Thomas R. Howard, Industrial Conservation, Cogeneration, and Utilization of Alternative Fuels.
- Fld 53 Miscellaneous. Industrial Application Experiment Series. Part 1 of 2.
- Fld 54 Part 2 of 2.
- Fld 55 Miscellaneous. Dr. Richard B. Davis, An Analysis of the Economic Viability of A Solar Thermal Point Focusing Electric Plant for Santa Catalina Island; A Case Study.
- Fld 56 Miscellaneous. Ran Manvi, Tosh Fujita, "Performance and Economic Risk Evaluation of Dispersed Solar Thermal Power Systems By Monte Carlo Simulation," pp.1535-15450.
- Fld 57 Miscellaneous. Carole L. Hamilton, "Dynamic Modeling and Sensitivity Analysis of Solar Thermal Energy Conservation Systems," pp.1218-1223.
- Fld 58 Miscellaneous. Toshio Fujita, Nabil El Gabalawi, e.g., "Comparative Evaluation of Distributed Solar Thermal Electric Power Plants," pp. 1600-1607.
- Fld 59 Miscellaneous. Dr. M. Kudret Selcuk, e.g., "Solar Stirling Power Generation: Systems Analysis and Preliminary Tests," pp. 20-6 - 20-10.
- Fld 60 Miscellaneous. Draft, Richard B. Davis, "Overview of the Alternative Power System Economic Analysis Model," pp.1-19.

Fld 61 Miscellaneous. "Effects of Surface Optical Characteristics on Point Focusing Solar Collectors," pp.1-27.

Fld 62 Miscellaneous. Dr. Marc A. Adams, William F. Carroll, e.g., "A Methodology For Assessing the Benefits of Absorber Coatings For Solar/Thermal Receivers," pp. 409-435.

Catalog Description

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1.5 c.f. in 62 folders

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Register available in the repository.

Tracings

Jet Propulsion Laboratory-History

United States Dept. of Energy

SOLAR THERMAL CONVERSION - 2 nasat

SOLAR THERMAL POWER SYSTEMS - 2 nasat

SOLAR THERMAL TECHNOLOGY - 2 nasat

SOLAR THERMAL ENERGY - 2 nasat

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